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<b>(54) Title:</b> TRANSACTION SYSTEM  <b>(57) Abstract</b>  A network transaction system including terminals and database servers which are adapted to issue transaction cards as well as to accept cards for subsequent transaction use. The cards include impersonal information, i.e. not including any personal information about the user, and the terminals are adapted to capture personal information directly from the user for verification purposes. The impersonal information on the card and the personal information of the user are discrete.		

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"TRANSACTION SYSTEM"

This invention relates to a network transaction system including terminals and database servers and a multi-layer transaction card. Preferably the cards are adapted for machine printing and terminal printing of recorded information on different layers, and the terminal is adapted to transmit the recorded information to a database for electronic transactions between terminal and server.

The word "card" is used herein generally, to include any kind of ticket, token or document requiring registration and subsequent validation.

Existing thermal printing materials include thermal sensitive paper for document printing of receipts and letters using dot-line thermal printers.

The main disadvantage of the known materials is that they discolour on exposure to light, resulting in short shelf life, and the thermal image fades, resulting in illegible printed text. Another disadvantage of known materials is that the thermal coating is applied onto the upper surface of the substrate, resulting in low wear resistance for continuous handling. A further disadvantage is that the exposed thermal coating is susceptible to degradation from humidity and temperature.

Printing terminal devices are known, such as facsimile terminals and retail terminals which incorporate printers for thermal printing of letters and receipts using

single sheets or continuous rolls of thermal sensitive paper. Standard thermal print-heads consist of heating elements which are 7-dot high x 5-dot wide or 8-dot high x 5-dot wide to form each character for dot-line printing using a reciprocal print-head or consist of a single row of heating elements for dot-line printing using a stationary print-head.

The main disadvantage of these known devices is that they require complex means to synchronise the paper feed for dot-line printing, requiring geared control means for continuous line by line printing onto thermal paper materials, thereby involving intermittent mechanical and electrical sequences for paper lifting and paper printing. Another disadvantage is that known devices are limited to printing on flexible materials in roll form and not for printing on semi-rigid materials in single card form or fan-fold card form as described herein.

These disadvantages are generally known and considered to be acceptable for producing thermal printed documents using dot-line print-heads assuming that the exposed thermal layer is not exposed to continuous natural or artificial light after terminal printing. One aspect of the present invention aims to avoid or at least to mitigate these disadvantages.

Accordingly a first aspect of the present invention provides a transaction system for executing a registration transaction at a terminal for card issue and recording the

registration transaction at a database server for card audit, comprising:

(a) means for receiving an unissued card in the terminal;

(b) means for generating a card registration for printing on the card at a terminal for card issue;

(c) means for generating a card identifier to register the card identifier at a server for card audit; and

(d) means for transmitting the card identifier between the terminal and server to create a record or data file in a database server to record the registration transaction for card audit.

A second aspect of the present invention provides a transaction system for executing a validation transaction at a terminal for card use and recording the validation transaction at a database server for card audit, comprising:

(a) means for receiving an issued card in the terminal;

(b) means for reading a card identifier printed on the card to verify the card identifier at the server for card use; and

(c) means for transmitting the card identifier between terminal and server to locate a record or data file in the database server to validate the card and record the validation transaction for card audit.

The invention also extends to a transaction system including a network of terminals and database servers, for

executing a registration transaction at a terminal for card issue and recording the registration transaction at a database server for card audit, and for executing a validation transaction at the terminal for card use and recording the validation transaction at the database server for card audit using the same card at any database terminal.

A third aspect of the present invention provides a transaction system for executing a registration transaction at a terminal for card issue to a card user, and recording the registration transaction at a database server for card audit, comprising;

- (a) means for receiving an unissued card in the terminal;

- (b) means for generating a card registration for printing on the card at the terminal for card issue;

- (c) means for generating a card identifier to register the card identifier at a server for card audit;

- (d) means for capturing a biometric image in the terminal

- (e) means for generating a user identifier from the biometric image to register the user identifier at the server for card audit; and

- (f) means for transmitting the card identifier and user identifier between terminal and server to create a record or data file in a database server to record the registration transaction for card audit.

A fourth aspect of the present invention provides a

transaction system for executing a validation transaction at a terminal for card use and a card user and recording the validation transaction at a database server for card audit, comprising:

(a) means for receiving an issued card in the terminal;

(b) means for reading a card identifier from the card to verify the card identifier at the server for card use;

(c) means for capturing a biometric image in the terminal; and

(d) means for generating a user identifier from the biometric image to verify the user identifier at the server for card use;

(e) means for transmitting the card identifier and user identifier between terminal and server to locate a record or data file in a database server to record the validation transaction for card audit.

Preferably the terminal comprises an in-line card pathway with a common entry and exit slot, means for conveying a card between a first stop position and a second stop position and comprising engaged rollers for gripping and transporting the card, and means for holding the card in the second stop position for a predetermined time, means for transporting the card to the first stop position, and means for reading the card and then releasing the card from the slot.

The invention also extends to a card for use in cardholder terminal transactions, comprising a multi-layer material including a layer of thermographic material covered by a barrier layer adapted to prevent fading of a thermographic image formed on the said material.

The multi-layer material preferably comprises of sheet materials such as paper, cardboard, plastic film, metal foils and fabric and incorporates coating materials such as solvent based polymers and inks, rubbers and waxes, with adhesive and thermal properties to prefabricate the multi-layer material in sheet or fan-fold format. The multi-layer material is primarily intended for producing printed documents such as cards, tickets, tokens and forms for terminal issue of registrations to authorise electronic transactions, but not limited to transaction applications, for example, the terminal issue of vehicle excise and driving licence documents, and any form of security document. For simplicity, the multi-layer material will be referred to in card form as a multi-layer card or card.

Depending on the intended purpose, the multi-layer card comprises of two to five layers selected for their individual properties to produce card types for specific use and function. Preferably, the multi-layer card for all card types is designed for machine printing (which may be thermal) on both sides of the card to print the card text and card code, and for terminal printing in the thermal print zone to print a card registration. The machine



printing and terminal printing is preferably applied to different layers of the multi-layer card for card description and card registration to provide separate security printing operations, before and after terminal issue.

The multi-layer card may be constructed as a two-part laminate in which an adhesive coating is applied to one side of a substrate sheet to form the lower part, and a barrier coating and thermal coating is applied to an overlay film to form the upper part, and the two parts are adhesive bonded, thereby forming a material with an upper overlay and lower substrate, each coating forming a separate layer contained within the laminate to form a five-layer card. The overlay film, which is transparent, is intended to provide high wear resistance and the barrier layer, which is pastel coloured, is intended to prevent the thermal layer from degrading during use.

The multi-layer card may also be constructed without lamination by first applying the thermal layer to one side of the substrate sheet and then applying the barrier layer directly on top of the thermal layer to form a barrier coated card, ready for machine printing, to print the card text and card code, and define the thermal print zone for card registration. In this example, the overlay film is not used and the thermal and barrier layers exhibit adhesive properties to form a three-layer card. Alternatively the substrate sheet may include temperature sensitive properties

to provide a two-layer card.

A further advantage of the multi-layer card is that the same equipment for machine printing of the card text and card code may be used for applying the barrier layer to the overlay film or applying the barrier layer to the thermal layer in a range of colours and densities to enable successive machine printing operations to be used for producing the cards using high speed equipment based on standard letterpress, lithographic or intaglio methods.

One embodiment of the terminal device is intended for cardholder transactions at paydesks and checkouts in retail outlets using multi-layer cards and is a dual function terminal, to print and issue cards for card registration, and to read and verify cards for card validation. Depending on the card description for each card type, consumers buy cards for card registration and use cards for card validation for cardholder transactions in shop and store outlets. The range of card types includes, for example, credit cards and charge cards, lottery and competition cards, voucher and loyalty cards, pension and trust cards, subscription and membership cards, loan and mortgage cards.

When a multi-layer card is inserted in the terminal for card registration, the terminal generates a set of numbers, letters or symbols, for printing within the thermal print zone on the card, and generates a registration code to form a card identifier for transmission in binary to a

remote database server to create a record in the database. The card registration is formed on the thermal layer by thermo-chemical reaction to provide a permanent image on the multi-layer card for subsequent terminal insertion to read the registration code to form the card identifier for transmittal to verify the card registration for card validation to complete a cardholder transaction.

In the preferred form of the terminal device the print-head of the terminal printer consists of an array of heating elements in row-orientation for energising each row of heating elements in a pre-determined sequence to form the complete card registration in the thermal print zone when the multi-layer card is inserted in the terminal and held in the stationary position for terminal printing of the card registration.

Preferably the terminal device is such that the multi-layer card can be inserted in the terminal with the overlay film facing the print-head to enable the overlay film to be pressed against the array of heating elements which are selectively energised for heat transference to the thermal layer to produce the thermo-chemical reaction, whereby the thermal layer and barrier layer simultaneously change to black to form a permanent image of the card registration below the overlay film, within the heated areas defined by each heating element. The layers which form the said upper part may be only 80 microns in thickness to enable the card registration to be thermal printed at high

speed.

Preferably the terminal device is so arranged that a multi-layer card (of laminate or non-laminate form) is held in a stationary position for terminal printing using a dot-zone or dot-line print-head for thermal printing rather than the method of terminal printing using a dot-line print-head for paper printing and paper lifting cycles currently used in known terminal devices.

Some embodiments of the invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings, in which:

Figure 1 shows the front face of the multi-layer material in card form.

Figure 2 is an enlarged cross section of Figure 1 constructed in one multi-layer variant.

Figure 3 is an enlarged cross section of Figure 1 constructed in another multi-layer variant.

Figure 4 is an enlarged cross section of Figure 1 constructed in another multi-layer variant.

Figure 5 is an enlarged cross section of Figure 1 constructed in another multi-layer variant.

Figure 6 shows the front face of a multi-layer card with one example of card registration for terminal printing in the thermal print zone.

Figure 7 shows the front face of a multi-layer card with another example of card registration for terminal printing in the thermal print zone.

Figure 8 shows a range of number and symbol combinations for card registration, for terminal printing in the thermal print zone.

Figure 9 is a plan view of the terminal device for cardholder transactions.

Figure 10 is a rear view of the terminal device for cardholder transactions.

Figure 11 is a side elevation in part cross section of the terminal printer and scanner in the rear section of the terminal device.

Figure 12 is a front view of the dot-zone print head shown in view X-X of figure 11.

Figure 13 is a side elevation in part cross section of an alternative terminal printer.

Figure 14 is a side elevation in part cross section of the terminal sensor and display in the front section of the terminal device.

Figure 15 shows the terminal transaction sequences for the print and issue of card types for card registration.

Figure 16 shows the terminal transaction sequences for the read and verify of card types for card validation.

Figure 17 shows the front and rear face of a credit card for terminal transaction before and after card registration.

Figure 18 shows the front and rear face of a lottery card for terminal transaction before and after card

registration.

The following terms are used in the following description of the preferred embodiments with the following meanings:

Network: Terminals which are preferably carrier-linked to servers to form independent networks for automated card transaction, each network comprising different card types for registration and validation transactions.

Database terminal: A terminal incorporating a database for compiling registration data to print on a document (card) and for compiling identifier data to transmit a registration code for the document and to transmit a template for a fingerprint (user).

Database server: A server incorporating a database to receive identifier data from a database terminal and transmit identifier data to a database terminal.

Card identifier: Impersonal information printed on a document in a database terminal to form a registration code for transmission as a discrete card identifier to a database server.

User identifier: personal information captured on a biometric sensor in a database terminal to form a template such as a fingerprint template for transmission as a discrete user identifier to a database server.

Data file: A record of identifier data stored in a database server for matching the registration code of a document (card identifier) and the template of a fingerprint

(user identifier), and to record a valid transaction for audit.

Figures 1 and 2 show the card 1 constructed of a multi-layer material 2 for machine printing and terminal printing according to the invention, in which the multi-layers 3 to 7 for material 2 cover the front face of card 1.

The overlay 3 is a transparent plastic film with a coloured barrier layer 4 bonded to one side of the overlay 3, and a thermal layer 5 bonded to the barrier layer 4 to form the upper part of the material 2 for lamination to the lower part.

The overlay 3 may comprise any rigid or plasticised plastic film such as terephthalate polyester or polyvinyl acetate in the thickness range 10 to 200 microns. The overlay 3 is surface treated on the underside for machine printing, to print the card text (not shown) in barrier area 4A, print the card code (not shown) in barrier area 4B, print the opaque borders in barrier areas 4C to define the thermal print zone 4D and apply the barrier layer 4 in the thickness range 10 to 50 microns to complete the machine printing operation before the thermal layer 5 is applied in the thickness range 10 to 100 micron as the final production step to complete the upper part of the lamination.

The barrier areas 4A to 4D vary in colour density and resolution. For example, the barrier area 4C is machine printed in 100% colour density and high resolution to provide opaque borders on card 1. The barrier areas 4A and

4B are machine printed with the barrier layer 4 in 50% colour density and high resolution. The barrier area 4D is machine printed with the barrier layer 4 in 50% colour density and medium resolution as this area is used for terminal printing of the card registration on card 1. Machine printing of the card text and card code, (not shown) and opaque borders (4C), and the barrier layer 4 in barrier areas 4A, 4B and 4D is visible underneath overlay 3.

The thermal layer 5 may comprise any thermal sensitive coating which reacts to temperatures in the 40°C to 100°C range to generate the thermo-chemical reaction to form the permanent image from white to black in the thermal print zone 10 for card registration.

The lower part of the material 2 comprises the adhesive layer 6 and substrate 7 for lamination to the upper part of material 2. The adhesive layer 6 may comprise any polymer or rubber such as acrylic and polyurethane for applying to the substrate 7 in the thickness range 10 to 100 microns to provide the contact adhesive layer 6 for laminating the said lower part to the said upper part. The substrate 7 may comprise any printing grade of paper, cardboard or plastic composite in the thickness range 100 to 400 microns to provide a compressed smooth substrate for machine printing, to print the card text of the card type on the side of substrate 7 which is the rear face of card 1.

A wax or silicone backing sheet may be placed on top of the adhesive layer 6 for substrate 7 storage or delivery of the



said lower part for subsequent laminating to the said upper part.

It will be understood that the material 2 in this example consists of an upper part made up of the three layers (overlay 3, barrier 4 and thermal 5), and of a lower part made up of the two layers (adhesive 6 and substrate 7), thus forming a five layer material 2 on final lamination.

Figure 3 shows the material 15 variant for card 1 in figure 1 whereby a four layer construction is produced by using an adhesive-thermal coating to provide an adhesive-thermal layer 16 for laminating the upper part and lower part together. In this example, the material 15 is designed to provide a thinner laminate card 1.

Figure 4 shows the material 17 variant for card 1 in figure 1 whereby a five layer construction is produced without substrate 7 by using two overlays 3, two barrier layers 4 and one adhesive-thermal layer 16, for laminating the upper part and lower part together. In this example, the material 17 is designed to provide an all plastic laminate for card 1.

Figure 5 shows the material 18 variant for card 1 in figure 1 whereby a three layer construction is produced by using the barrier layer 4 as the card surface instead of overlay 3. In this example, the material 18 is designed as a one part material 18 requiring no adhesive layer 6 as the barrier layer 4 is applied and adhered direct to the thermal layer 5 which is applied and adhered to the substrate 7, to

provide a low cost non-laminate card 1.

Figure 6 shows the front face of card 1 with a card text zone 8 and card code zone 9 for machine printing the card text and card code (not shown), and shows by way of example, a card registration 20 formed in the thermal print zone 10 after terminal printing, to provide a laminate variant for card 1. This card registration is designed for a credit card 1 or trust card 1.

The card registration 20 consists of, from left to right, the registration logo 21 the registration mark 22 and registration code 23 which are permanent images formed by the terminal printer 50 which will be described later.

The logo 21 is generated by the terminal computer to identify the card-issuer and authenticate terminal printing of the card registration 20 for cardholder transaction subject to the terms and conditions of use granted by the card-issuer to the cardholder. The logo 21 acts as a security seal formed as a permanent image in the thermal print zone 10.

The mark 22 is randomly generated by the terminal computer to form a 14 digit registration mark 22 to represent the card-issuer serial number which includes the 6 digit card issue date. The terminal 30 is preloaded with a serial block of 8 digit numbers for 5000 cardholders and a serial block of 3 digit numbers for 1000 card types to form a common pool of numbers for each card type and provide 11 digit serial numbers with five million combinations per

terminal. The 8 digit serial number forms part of the 14 digit registration mark 22 (the 6 digit issue date forms the other part) for terminal printing in the thermal print zone 10.

The code 23 is shown as a data matrix symbology and generated by the terminal computer to compile the card registration 20 as the point of origin. The code 23 consists of the card type number (3 digit) in the card code zone 9, the terminal number (5 digit), the registration mark 22 (14 digit), and the issue time (4 digit) to form a 26 digit data matrix as the code 23 for terminal printing in the thermal print zone 10. The terminal 30 generates the code 23 to form the card identifier for transmission in binary to the card type server for database entry to record the card registration 20 for card 1.

It will be understood that the card registration 20 is recorded in the code 23 on card 1 and in the database of the card type server. As a consequence the card 1 can now be used for cardholder transactions at any terminal 30 as the code 23 is read by the terminal scanner 45 and transmitted for facsimile matching at the database for card validation.

Figure 7 shows the front face of card 1 of identical layout as described above, except that the card registration mark 25 consists of a registration mark 26 and registration code 27 formed in the thermal print zone 10 after terminal printing to provide or a low cost non laminate variant for card 1. This card registration is designed for a lottery

card 1.

The mark 26 comprises of numbered symbols which are generated by the terminal computer to form a set of five symbols to represent a lottery game-line for matching with the lottery prize-line which is machine printed in the barrier area 4A (not shown) on card 1. The terminal 30 is also preloaded with the numbers and symbols to form a common pool of symbols for terminal printing in the thermal print zone 10.

The code 27 is shown as a data matrix symbology generated by the terminal computer to compile the card registration 25 as the point of origin. The code 27 consists of the card type number (3 digit) in the card code zone 9, the terminal number (5 digits), the registration mark 26 (20 digits), the issue date (6 digits) and the issue time (4 digits) to form a 38 digit data matrix as the code 27 for terminal printing in the thermal print zone 10. In this case, the terminal 30 receives the code 27 as the card identifier which is transmitted in binary from the card type server for terminal printing of the registration mark 26 and code 27 to form the card registration 25 on card 1.

Figure 8 shows a typical range of registration markings 28 which are randomly generated by the terminal computer to form different combinations for different card types as exemplified in figure 7. It will be understood that the permutations for forming sets of registration marks 28 based on the illustrated numbers, letters and symbols in any

combination, for different card types, are to an order of magnitude.

The terminal 30 includes a terminal main board 68 in the front compartment 67 with processor, RAM, hard disk and modem, power supply and standby battery, and associated interfaces to operate the printer 50, scanner 45, keyboard 36, display 35 and sensor 34, and to transmit all registration codes (for example 23 and 27) to and from the carrier-linked servers for facsimile matching of card registrations (for example 20 and 25) to verify any card registration for card validation to complete any cardholder transaction.

Figures 9 and 10 show the terminal 30 in plan and rear views and comprises of a front panel 31 and top panel 32 for mounting the sensor surround 33 fitted with the terminal sensor 34. Adjacent to the sensor 34 is the terminal display 35 which is fitted with two screens for viewing by the cardholder and terminal attendant. Adjacent to the display 35 is the terminal keyboard 36 for attendant operation in retail shops and stores, to serve cardholders at the point of sale.

Adjacent to the keyboard 36 is the access cover 37 for service access to the rear compartment 44, delimited by internal wall 42, rear panel 39, side panels 40 and base 41 to contain the terminal scanner 45 and terminal printer 50 for terminal printing of card 1. The access cover 37 incorporates the card slot 38 to insert card 1 for card

registrations and card validations.

The terminal 30 is therefore encased by the front panel 31, top panel 32, display 35, keyboard 36, access cover 37, rear panel 39, side panels 40 and base 41, to provide a self contained terminal 30 for counter placement in retail outlets for multi-card transactions.

Figures 11 and 12 show the position of the scanner 45 and printer 50 housed in the rear compartment 44 of the terminal 30. The scanner 45 is rigidly supported on brackets 47 connected to the two vertical side plates 51 of the printer 50 shown in part cross section. The two side plates 51 are rigidly mounted to the internal wall 42 to position and align the printer 50 and scanner 45 with the card slot 38 in the access cover 37 for manual insertion of card 1 in the terminal 30.

The scanner 45 incorporates a video camera and emits a beam 46 with processor and output electronics (not shown) to read data matrix symbology. The scanner 45 is therefore aligned to read the data matrix (not shown) in the card code zone 9 on insertion of card 1 to identify the card type number (3 digits), and read the data matrix in the thermal print zone 10 after terminal printing of the registration code 23 and 27 on card 1 prior to card removal from the terminal 30.

The scanner 45 is positioned to read the data matrix in the code zone 9 and print zone 10 at the 1st stop position 63 for card identification, card registration and

card validation to provide mechanical and electrical simplicity using one scanning and printing system for all terminals 30.

The terminal printer 50 comprises two vertical side plates 51 which are spaced apart to allow for the card 1 to pass between each vertical side plate 51 for guidance. The two vertical side plates 51 are rigidly connected at the top by the transverse bridge guide 53 and at the bottom by the base plate 52. The bridge guide 53 is an extended card slot to self-align the card 1 for vertical insertion and removal of card 1.

Positioned below the bridge guide 53 are the two transverse nip-rollers 54 mounted in bearings at each end in the two vertical side plates 51 for drive rotation by a geared electric motor (not shown) mounted on the other side of one of the side plates 51. The motorised nip-rollers 54 contra-rotate and are synchronised by meshed gears 49 to ensure equal rotation when the card 1 is transported between the nip-rollers 54 and card guides 65, either downwards by inward rotation or upwards by outward rotation between the 1st stop position 63 and the 2nd stop position 64.

The control means to start and stop the motorised nip-rollers 54 is activated by the keyboard 36 to instruct descent of card 1 from the 1st stop position 63 to the 2nd stop position 64 and deactivated by the sensor 62. The control means to start and stop the motorised nip-rollers 54 is then activated by the solenoid 60 (retract) to instruct

ascent of card 1 from the 2nd stop position 64 to the 1st stop position 63 and deactivated by a timer (not shown). The 2nd stop position 64 is used for terminal printing.

Positioned below the motorised nip rollers 54 is the transverse print head 55 rigidly mounted in the side slots 57 of the two vertical side plates 51 with the dot-zone array 56 positioned opposite the resilient facing 66 bonded to the displaceable flat platen 59 which is connected to the actuator bar of solenoid 60. The solenoid 60 is connected to bracket 61 which is rigidly mounted on base plate 52.

The control means (not shown) for operating the print head 55 is electronically connected to the pin connector 58 of the print head 55. The heating elements are contained within the body of the print head 55 and visible in figure 12 through section view X-X as the dot-zone array 56. The dot-zone array 56 of the print head 55 consists of rows of miniature heating elements, each capable of independent operation by applying electrically pulsed energy in programmable row by row sequence by software means known per se.

The dot-zone array 56 for a thermal print area of 8mm high x 80mm wide consists of 40,960 heating elements based on 8 dots per millimetre to achieve high resolution images using dot-zone thermal printing. In operation, the card 1 is pressed against the dot-zone array 56 by the displaceable flat platen 59 in the stationary position during terminal printing, and the energy pulse of each



heating element transfers heat to the thermal layer 5 of card 1 to form permanent images made up of individual dots by thermo-chemical reaction.

It will be understood that the thermal print zone 10 on card 1 is designed to locate in the printer 50 at the 2nd stop position 64 to ensure that thermal print zone 10 is positioned between the print head 55 and the displaceable flat platen 59 for terminal printing of any card registration, for example 20 and 25, on card 1. Furthermore, when the displaceable flat platen 59 is retracted, a vertical pathway is provided for the card 1 to descend to the 2nd stop position 64 for terminal printing.

Figure 13 shows an alternative terminal printer 70 of a similar construction to the printer 50 except that the print head 71 incorporates a dot-line array 72, for example 0.1mm high x 80mm wide, and displaceable circular platen 73 with a drive shaft 75 mounted in spring biased slide bearings (not shown) housed in the two vertical side plates 51 for sequential reciprocation by the motorised camshaft 76 and sequential rotation by the nip-rollers 54, in operation, the circular platen 73 moves backwards and forwards for close-open motion caused by the spaced apart end cams 77 on the motorised camshaft 76 engaging with the drive shaft 75 of the circular platen 73. The circular platen 73 includes a resilient facing 74 and the drive shaft 75 rotates in unison with the nip-rollers 54 by meshed gear interconnection (not shown) on the outside of one of the vertical side plates 51

during the card lifting sequence in the open position.

In operation, the close-open cycles are mechanically synchronised for card printing in the close position and card lifting in the open position. As a consequence, the circular platen 73 presses the card 1 against the dot-line array 72 in the close position for card printing, and the circular platen 73 releases the card 1 in the open position for card lifting by the nip-rollers 54 to complete each close-open cycle.

The resilient facing 74 of the circular platen 73 is made to deform on contact with card 1 to increase the contact area and therefore the pressing area against the card 1 in the close position which is greater than the print area of the dot-line array 72. The nip-rollers 54 in unison with the circular platen 73, partially rotate to lift card 1 and revolve platen 73 in dot-line increments in the open position.

It will be understood that the heating elements of the dot-line array 72 are also timed for energy pulsing in the closed position to transfer heat to the thermal layer 5 of card 1 to form permanent images made up of individual dots for each dot-line print and lift cycle. The dot-line array 72 has a smaller print area, for example, 0.1mm high x 80mm wide, requiring less heating elements whilst maintaining mechanical and electrical simplicity like terminal printer 50.

Figure 14 shows the position of the terminal sensor

34 on the top panel 32 of the terminal 30. The sensor 34 is mounted to the underside of the moulded surround 33 with the face of the sensor 34 flush fitted in a guide recess 33c of the surround 33 for finger placement. The surround 33 includes register lines 33a, 33b to provide visual guides for placing any finger in one position on the sensor 34 by aligning the cuticle on the fingernail side of the finger with the register lines 33a, 33b and simultaneously positioning the finger in the centre of the recess 33c. The register lines 33a, 33b and recess centre position represent an imaginary X and Y axes on the face of the sensor 34 (which is therefore not shown). The sensor 34 is used for capturing "live-scan" fingerprint images to generate user identifiers for transmission in binary to the carrier-linked servers for database entry to store personal fingerprint templates in addition to the registration 20 for card type facsimile matching at the server end.

It will be understood that the registration code 23 and fingerprint template are generated by the terminal software to form a two part byte stream comprising a card identifier and user identifier for binary transmission, and orientated with the registration code 23 acting as a pathfinder for call routing to the correct card type server and locate the correct registration code 23 stored in the database for facsimile matching of two constants 23. As a consequence, the live-scan fingerprint template and stored fingerprint template can be compared to accept or reject the

user of card 1 at any terminal 30. (It should be noted that live-scan fingerprint templates are variable due to daily biological changes).

Situated in the front compartment 67 of the terminal 30, delimited by internal wall 42, side panels 40, front panel 31, top panel 32, and base 41 is the mainboard 68 with processor (not shown) and associated elements for operating the terminal 30 in conjunction with the keyboard 36 and dual display 35 mounted on the top panel 32. The dual display 35 incorporates two display screens for viewing by the terminal attendant and cardholder at the same time for terminal transactions.

Figure 15 lists the terminal operation sequences with reference numbers to print and issue the card registration 20 on a credit card 1, and to print and issue the card registration 25 on a lottery card 1, which are further illustrated in figures 17 and 18 for additional explanation.

The terminal sequence 80 for credit card 1 is a double print operation as the credit card 1 is a two part card with a perforation for separating the card 1 into two parts whereby the upper part is handed to the card holder and the lower part is retained by the retailer after terminal issue. As a consequence, the lower part is first inserted in the terminal 30 for terminal printing and removal for separation, and the upper part is then inserted in the terminal 30 for terminal printing and removal.

The terminal sequence 81 for lottery card 1 is a single print operation as the lottery card 1 is a one part card. As a consequence, the card 1 is inserted in the terminal 30 for terminal printing and removal. This card 1 is designed for registered, licensed and promotion lotteries and is categorised as a prize-line lottery system. Figure 18 shows a lottery card 1 for free prize promotions.

Figure 16 lists the terminal operation sequences with reference numbers to read and verify the card registration 20 on a credit card 1 for card validation and read and verify the card registration 25 on a lottery card 1 for card validation, which are further illustrated in figures 17 and 18 for additional explanation.

The terminal sequence 82 for credit card 1 is applicable for card validation at the terminal 30 with cardholder identification for card validation. As a consequence, the sensor 34 is pressed by the cardholder when the credit card 1 is inserted into the terminal 30 to locate the card registration 20 by facsimile matching and verify the cardholder identity by template matching for card validation and credit transaction at the database server.

The terminal sequence 83 for lottery card 1 is applicable for card validation at the terminal 30 without cardholder identification. As a consequence, the sensor 34 is not used for cardholder identification and the lottery card 1 is inserted into the terminal 30 to locate the card registration 25 by facsimile matching for card validation

and prize award at the database server.

Figure 17 illustrates the credit card 1 based on the multi-layer material 2 before and after terminal printing of the card registration 20 in the two part thermal print zone 10.

The credit card 1 describes the card text in the card text zones 8 on the front face 85, 86, and on the rear face 87, 88, which are machine printed during card 1 production. The thermal print zone 10 is shown sub-divided for terminal printing of the card registration 20. The upper part of credit card 1 for card holder use, after terminal printing, shows the logo 21, mark 22 and code 23, to form the card registration 20 as permanent images on the barrier layer 4 which is underneath the overlay 3 as shown in figure 2.

Figure 18 illustrates the lottery card 1 based on the multi-layer material 18 before and after terminal printing of the card registration 25 in the one part thermal print zone 10.

The lottery card 1 describes the card text in the card text zones 8 on the front face 89, 90, and on the rear face 91, 92, which are machine printed during card 1 production. The thermal print zone 10 is shown sub-divided for terminal printing of the card registration 25. The lottery card 1, after terminal printing, shows the mark 26 (five symbols) and code 27 to form the card registration 25 as permanent images on the barrier layer 4 as shown in

figure 5.

A terminal transaction for card registration will now be described for a credit card 1 as illustrated in figure 17.

The two part card 1 is manually inserted in the terminal 30 at card slot 38 to the 1st stop position 63 and the scanner 45 reads the 3 digit matrix in the code zone 9 to illuminate the card selector key on the keyboard 36. The key is pressed which activates the motor to contra-rotate the nip-rollers 54 inwardly and thereby grip each side of card 1 to lower the card 1 between the card guides 65 and between the print head 55 and flat platen 59, whereupon the lower edge of card 1 makes contact with the sensor 62 at the 2nd stop position 64 to stop the motor driving the nip-rollers 54, and actuate the solenoid 60 to extend the flat platen 59 to press the card 1 against the dot-zone array 56, whereupon the print head 55 is energised for terminal printing in the thermal print zone 10 of card 1 which is now constantly pressed against the dot-zone array 56.

The print head 55 is controlled by the software to generate the energy pulses in row orientation to form lines of dots in sequential order by heat transference from the energised heating elements to the thermal layer 5 to cause the thermo-chemical reaction, whereby the thermal layer 5 discolours (black) at the points of heat contact which in turn discolours (black) the barrier layer 4 to produce a permanent image (in colour contrast to the original barrier

layer 4) made up of individual dots to form the card registration 20 in the thermal print zone 10 of card 1. The permanent image of the card registration 20 is now formed underneath the overlay 3.

The solenoid 60 is activated when the print head 55 completes the printing sequences and retracts the flat platen 59, whereupon the motor contra-rotates the nip rollers 54 outwardly to lift card 1 to the 1st stop position 63 and stop, and thereby activate the scanner 45 to read the (26 digit) data matrix code 23 to generate the code 23 bytestream to form the card identifier. The terminal display 35 now requests the cardholder to press the sensor 34 to generate the bytestream for the fingerprint template to form the user identifier, whereupon the terminal 30 orientates the two part bytestream, card identifier followed by the user identifier for binary transmission to the card type server to create a record or datafile in the database and receive display 35 acceptance, for the card 1 to be removed from the terminal 30.

The card 1 is a two part card and therefore has two thermal print zones 10. The lower part is now detached and the upper part is inserted in the terminal 30 for terminal printing at the 2nd stop position 64 and terminal removal as described above for duplicate printing only. The upper part of card 1 is handed to the cardholder ready for use.

A terminal transaction for card validation will now be described for the credit card 1 as illustrated in figure



17.

The one part credit card 1 is manually inserted in the terminal 30 at the card slot 38 to the 1st stop position 63 and the scanner 45 reads the (26 digit) data matrix code 23 in the thermal print zone 10 to illuminate the card selector key on the keyboard 36.

The terminal attendant keys-in the transaction value for terminal display 35 and requests the cardholder to press the sensor 34. The terminal 30 generates and orientates the three part bytestream, card identifier followed by the user identifier and then transaction value for binary transmission to the card type server to locate the record or datafile in the database by facsimile matching and verify the user identifier by template matching to enter the transaction value for credit transaction and receive display 35 acceptance (or rejection), for the card 1 to be removed from the terminal 30.

The terminal transactions for a lottery card 1 as illustrated in figure 18 use similar registration and validation procedures except that the lottery card 1 is a one part card and therefore has one thermal print zone 10 for terminal printing and the sensor 34 is not used for generating a user identifier and therefore no template matching is required.

The terminal transactions described above are completed within 15 seconds as the terminal 30 has continuous on-line connection to the computer centre for

call routing to the card type servers. It will be understood that some functions are subject to pre-settable timing and calibration, including removal of the print head 55 for service or maintenance and resetting due to the high issuing rates for card registrations.

The materials 2, 15, 17 and 18, can be modified in a number of ways.

Holograms, watermarks and like security features can be incorporated in the overlay 3. The barrier layer 4 can include compounds made up of materials such as indelible inks and iridescent inks, pearlescent and metallised inks, fluorescent and luminescent pigments, thermo-chromic and phosphorescent additives, light blocking compounds and ultraviolet stabilisers, printing fillers and opalescent admixtures.

The barrier layer 4 can be based on impact reactive materials or compounds to form the permanent images without applying heat using pressure such as encapsulated micro-cells containing liquids which burst on impact. In this modification, the thermal layer 5 is not used. The composition of the said materials can be electrosensitive comprising of surface conductive and reverse conductive properties for the conversion of electrical impulses instead of energy pulses. Alternatively, vacuum vapour-deposited metallised layers with electrical resistance can be used.

The said materials can be constructed for use as security, facsimile and other recording paper for bank

drafts and giro forms, airline tickets and rail tickets, payroll and account documents, in particular labels and envelopes, all capable of being dispensed from a terminal 30 in modified form for other uses such as vending or labelling in continuous roll form or fan-fold form from containers fitted to the terminal device 30.

The said materials can include electronic chips or magnetic layers, and use any two-dimensional symbology for card registration such as linear, stacked, graphs or the data matrix type, as exemplified above. Such symbologies are in the public domain and known as channel code, meter code, BC412, barcodes, planet code, PDF417, super code, maxicode, aztec code, data matrix, 3-DI, dataglyphs, snowflake code, and smart code, all capable of being used for terminal printing of the registration code 23 and registration code 27 in the thermal print zone 10.

The said materials can be used for signing names or writing information in the thermal print zone 10 using a heat pen or laser pen to form the permanent image without using the terminal device 30.

The terminal device 30 can be modified in a number of ways.

The terminal 30 can be adapted for reel feed or fan-fold feed of the card 1 by removing the base plate 52 of the printer 50 to allow continuous length of the said material, with horizontal lines of perforation and spaced apart for separation, to pass between a movable print head 55 and

fixed flat platen 59, the card guides 65 the nip-rollers 54, the bridge guide 53, and emerge from the card slot 38. In this modification, the said material is stored in a container underneath the terminal 30 to form a terminal storage device 30 for dispensing by token or coin-operation for vending machines and amusement machines, for card or ticket issue.

The flat platen 59 can be pivotably connected to the solenoid 60 or supported in end guides to provide accurate alignment during displacement in front of the dot-zone array 56 or dot-line array 72. The flat platen 59 can be used in place of the circular platen 73 in the form of a straight edge with a resilient facing 74 bonded along the edge side of the flat platen 59 and displaceable by non rotatable means as well as rotatable means, and guided in slideable mountings in each vertical side plate 51, and spring biased in one direction of reciprocation. Alternatively, the flat platen 59, circular platen 73, can be pendulum mounted to side plates 51 for oscillatory motion instead.

The printer 50 and 70 can be adapted for fitting a ribbon cassette for depositing a thermal printed image directly onto the overlay 3 or barrier layer 4 of card 1. The print head 55 can be adapted with a dot-line array 72 and slidably mounted for dot-line printing in row by row sequential order onto the stationary card 1. The print head 55 is mounted in slide slots 57 for spring biased operation. The dot-zone array 56 and dot-line array 72 can be used for

thermal printing a single or multiple line of dots or dashes to form permanent images in dot-matrix or segment configuration for numbers, letters, symbols or codes depending on the print area of the dot-zone array 56 and the dot-line array 72 for stationary print cycles.

The terminal device 30 is designed for modular side extension by removing the side panels 40 and fitting side sections for ticket printing to provide a terminal device 30 for printing cards and tickets using separate slots 38. The side panels 40 are fitted to the side sections of the terminal 30.

The terminal 30 is a database terminal which is carrier-linked to database servers to function as a telephone for electronic transactions and therefore can be used for on-line or dial-up modes of operation for inbound and outbound transmissions using existing line or wave means of communication.

## CLAIMS

1. A transaction system including at least one terminal and a database server for executing a card registration transaction at the terminal and recording the registration transaction at the server, comprising:

- (a) means for receiving the card in the terminal;
- (b) means for generating a card registration for printing on the card at the terminal for card issue;
- (c) means for generating a card identifier to register the card at a server for card audit; and
- (d) means for transmitting the card identifier between the terminal and the server to create a record or data file in the database to record the registration transaction.

2. A transaction system including at least one terminal and a database server for executing a card validation transaction at the terminal and recording the validation transaction at the server comprising:

- (a) means for receiving the card in the terminal;
- (b) means for reading a card identifier printed on the card; and
- (c) means for transmitting the card identifier between terminal and server to locate a record or data file in the database to validate the card identifier and to record the validation transaction.

3. A transaction system including a network of

terminals and database servers, so arranged that a card registration transaction or a card validation transaction may be conducted at any terminal, and the registration transaction or validation transaction may be recorded at a server located by the card type, the system comprising:

- (a) means for receiving the card in the terminal;
- (b) means for generating a card registration for printing on the card at the terminal for card issue;
- (c) means for generating a card identifier to register the card identifier at the server for card audit;
- (d) means for reading the card identifier printed on the card to verify the card identifier at the server for card audit; and
- (e) means for transmitting the card identifier between terminal and server to create a record or datafile in the database for card registration, or to locate the record or data file for card validation.

4. A transaction system according to any preceding claim in which the card registration includes an encrypted card identifier with impersonal card data for printing on the card and for reading from the card for impersonal card use.

5. A transaction system according to any preceding claim in which the card identifier includes a registration code which forms an impersonal identifier for encrypted transmittal between terminal and server for matching in a database.

6. A transaction system according to any preceding claim in which the terminal further comprises:

(a) means for detecting a user characteristic;

(b) means for generating a personal identifier from the user characteristic; and

(c) means for transmitting the personal user identifier, together with the impersonal card identifier, to the server for registration or validation purposes.

7. A transaction system according to claim 6 in which the user characteristic comprises a fingerprint image for live scan identification.

8. A transaction system for executing a registration transaction at a terminal for card issue to a card user, and recording the registration transaction at a database server for card audit, comprising:

(a) means for receiving an unissued card in the terminal;

(b) means for generating a card registration for printing on the card at the terminal for card issue;

(c) means for generating a card identifier to register the card identifier at a server for card audit;

(d) means for capturing a biometric image in the terminal; and

(e) means for generating a personal user identifier to be registered at the server for card audit; and

(f) means for transmitting the card identifier and user identifier between terminal and server to create a



record or data file in the database to record the registration transaction for card audit.

9. A transaction system for executing a validation transaction at a terminal for card use and a card user, and recording the validation transaction at a database server for card audit, comprising:

(a) means for receiving an issued card in the terminal;

(b) means for reading a card identifier printed on from the card to verify the card identifier at the server for card use;

(c) means for capturing a biometric image in the terminal; and

(d) means for generating a personal user identifier from the biometric image to verify the user identifier at the server for card use;

(e) means for transmitting the card identifier and user identifier between terminal and server to locate a record or data file in the database to record the validation transaction for card audit.

10. A transaction system according to any preceding claim in which the card identifier includes an encrypted two-dimensional symbology printed on the card.

11. A transaction system according to any preceding claim in which the card registration includes an issuer seal, and a reference number printed on the card to register a grantor on the card at the terminal.

12. A transaction system according to any preceding claim in which the card registration includes an issue number and date.

13. A transaction system according any preceding claim in which the card registration includes discrete symbols and characters printed on a card to register a game-line on the card at the terminal.

14. A transaction system according to claim 4 in which the encrypted card identifier is selected from a data file in a database for transmission from the server to the terminal to generate a registration on the card.

15. A transaction system according to claim 4 in which the encrypted card identifier creates a record or data file in a database for registration and locates the record or data file in a database to verify a validation transaction.

16. A transaction system according to claim 14 or claim 15 in which the encrypted card identifier has a constant order to create the record or data file and thereby locate the same record or data file in the database server for registration and validation.

17. A transaction system according to any one of claims 6 to 9 in which the card identifier is transmitted ahead of the user identifier so as to reference a record in the database which includes the personal identifier.

18. A transaction system according to any one of claims 6 to 9 in which the card identifier and user identifier are encoded before transmission and decoded after reception.

19. A transaction system according to any one of claims 6 to 9 in which the personal identifier is stored in the database as a template for subsequent matching.

20. A transaction terminal adapted for use in the transaction system of any preceding claim, including a database for compiling data to be applied to a card and/or transmitted to a server, at least one keyboard and display, a biometric sensor, and means for reading a card and transmitting data from the card and the sensor, to a database at the server.

21. A point of sale terminal according to claim 20 including:

(a) a keyboard and display for use by an attendant, for accepting card transactions, and

(b) a biometric sensor and a further display for use by a cardholder for authorising card transactions.

22. A transaction terminal according to claim 20 or claim 21 in which the sensor is adapted to capture a fingerprint image of the user and comprises guide means for positioning a finger on the sensor by aligning the cuticle of the fingernail with register lines on each side of the sensor.

23. A transaction system in accordance with any one of claims 3 to 17 and also incorporating a terminal according to claim 21 or 22.

24. A terminal according to any of claims 20 to 23 and further comprising an in-line card pathway with a common

entry and exit slot, means for conveying a card between a first stop position and a second stop position and comprising engaged rollers for gripping and transporting the card, means for holding the card in the second stop position for a predetermined time, means for transporting the card to the first stop position, and means for reading the card and then releasing the card from the slot.

25. A terminal according to claim 24 and further comprising writing means at the second stop position to write a card registration on the card for a terminal transaction, and scanning means at the first stop position to read a card identifier on the card for a terminal transmission.

26. A terminal according to claim 24 or claim 25 and further comprising a fixed print head and movable platen to provide a pathway for dot-line printing a thermographic card registration on a stationary card at the second stop position.

27. A terminal according to claim 24 or claim 25 and further comprising a movable print head and fixed platen to provide a pathway for dot-line printing a thermographic card registration on a stationary card at the second stop position.

28. A terminal according to claim 24 or claim 25 and also including a compartment to store a card material in fan fold format with perforated folds for printing a card registration at the second stop position, means for scanning

a card identifier at the first stop position and means for dispensing and separating the card material at the exit slot for individual card issue.

29. A terminal according to any one of claims 20 to 25 and also including detachable side panels for extending the terminal with additional slots for executing terminal transactions to register and validate cards and tickets made of different materials in sheet, reel or fan fold format.

30. A card for use in cardholder terminal transactions, comprising a multi-layer material including a layer of thermographic material covered by a barrier layer adapted to prevent fading of a thermographic print image formed on the said material.

31. A card according to claim 30 in which the material is machine printed and terminal printed with information on different layers.

32. A card for use in a transaction terminal according to claim 23 or claim 24, in which the card comprises two portions which are separable, one of which is for use by the cardholder after issue and the other is to be retained by the issuer.

33. A card according to any one of claims 30 to 32 in which the material is constructed in multiple layers for thermographic printing in a terminal according to any of claims 22 to 25 for printing an image on the material at the second stop position and scanning the image on the material at the first stop position.

34. A card according to any one of claims 30 to 32 in which the material is constructed of two layers comprising a substrate layer with temperature sensitive properties and a barrier layer with light resistant and adhesive properties applied to the substrate layer.

35. A card according to claim 34 in which the substrate layer and barrier layer are capable of changing state by thermo-chemical reaction or by thermo-chromic reaction.

36. A card according to claim 34 in which the barrier layer is applied to the substrate layer by machine printing to deposit a dense film of coloured ink prior to machine printing the information on to the barrier layer.

37. A card according to claim 30 in which the material is constructed of three layers comprising a substrate layer, a thermal layer with temperature sensitive and adhesive properties applied to the substrate layer and a barrier layer applied to the thermal layer for machine printing information on to the barrier layer.

38. A card according to claim 38 in which the material is constructed of four or five layers comprising a substrate layer with a self-adhesive coating forming one part of a laminate and a film layer including a barrier layer and thermal layer forming the other part of the laminate.

39. A card according to claim 38 in which the film layer is treated on one side for machine printing the information on to the film layer, followed by machine printing the barrier layer and followed by machine coating the thermal

layer to provide a pre-printed film layer with barrier and thermal properties.

40. A card according to any one of claims 30 to 39 in which the material is produced as a single item for terminal issue as a card, ticket, token, form or similar for a registration or validation transaction.

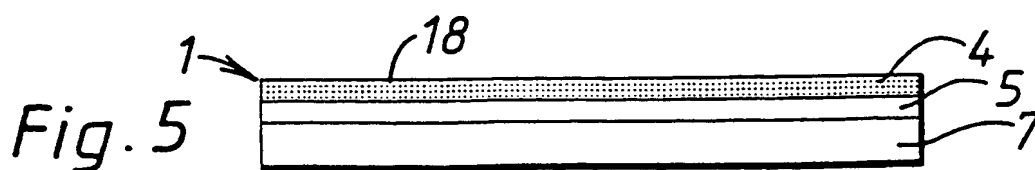
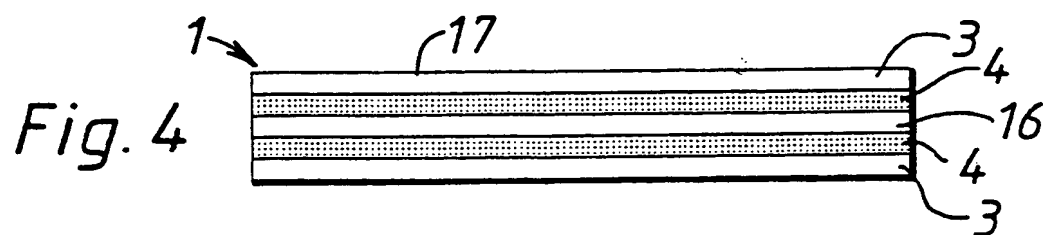
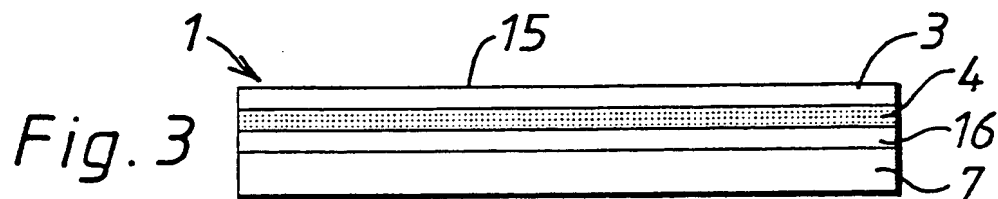
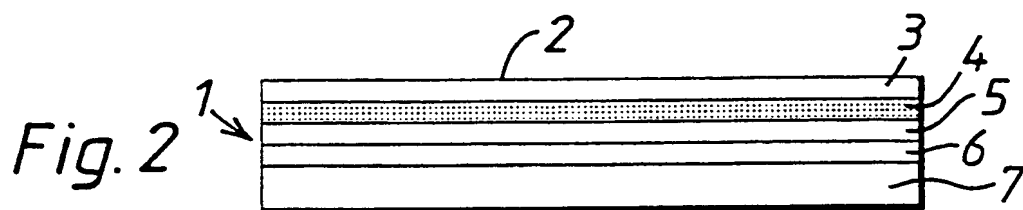
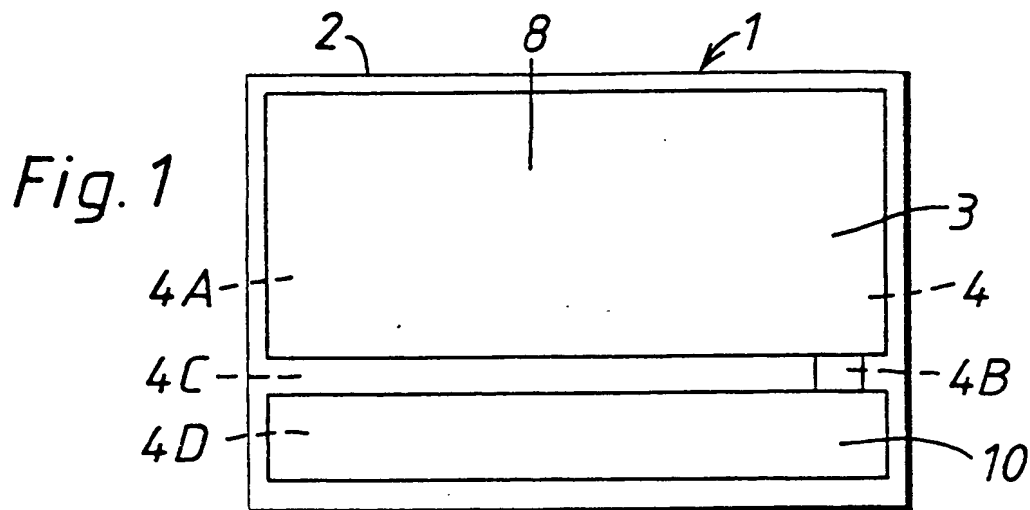
41. A card according to any one of claims 30 to 39 in which the material is produced in fan-fold format for terminal issue as a card, ticket, token, form or similar for a registration or validation transaction.

42. A card according to any one of claims 30 to 39 in which the material is produced with spaced apart perforations to provide single items comprising two parts or fan-fold parts for a registration or validation transaction.

43. A card according to any one of claims 30 to 39 in which the material is produced with machine printed information for card description and terminal printed information for card registration on the front and rear face of the material.

44. A card according to any one of claims 30 to 39 in which the material includes opaque barrier areas to define text zones and code zones for machine printing information and an encrypted two-dimensional symbology.

45. A card according to any one of claims 30 to 39 in which the barrier layer incorporates materials with sensor readable properties for detecting counterfeit material for a registration or validation transaction.





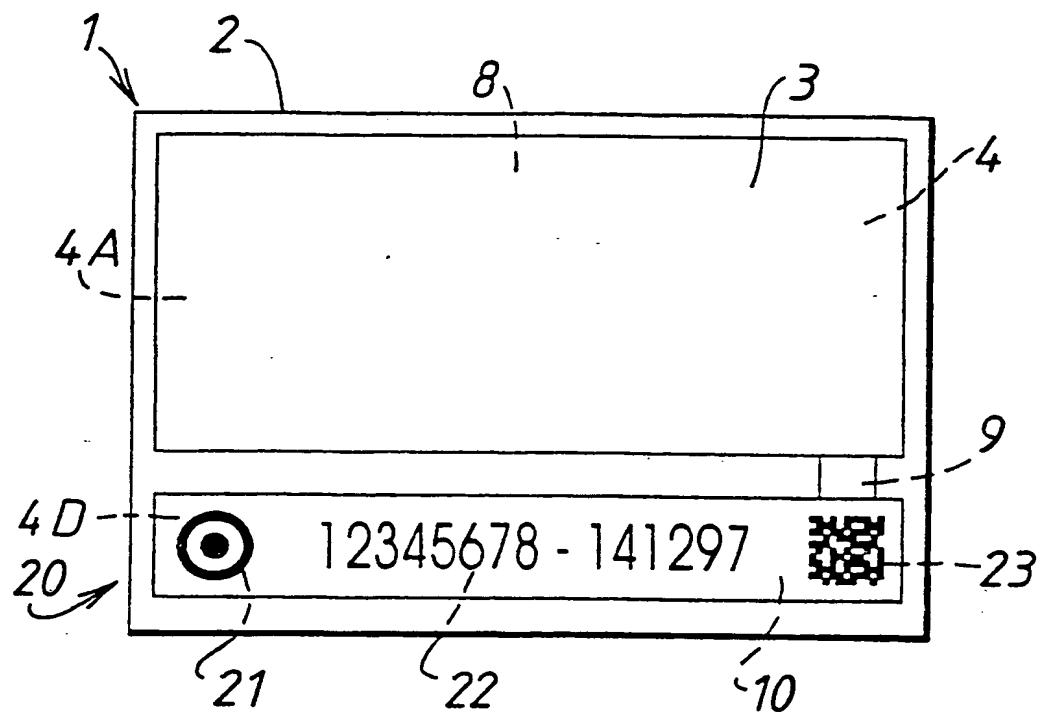


Fig. 6

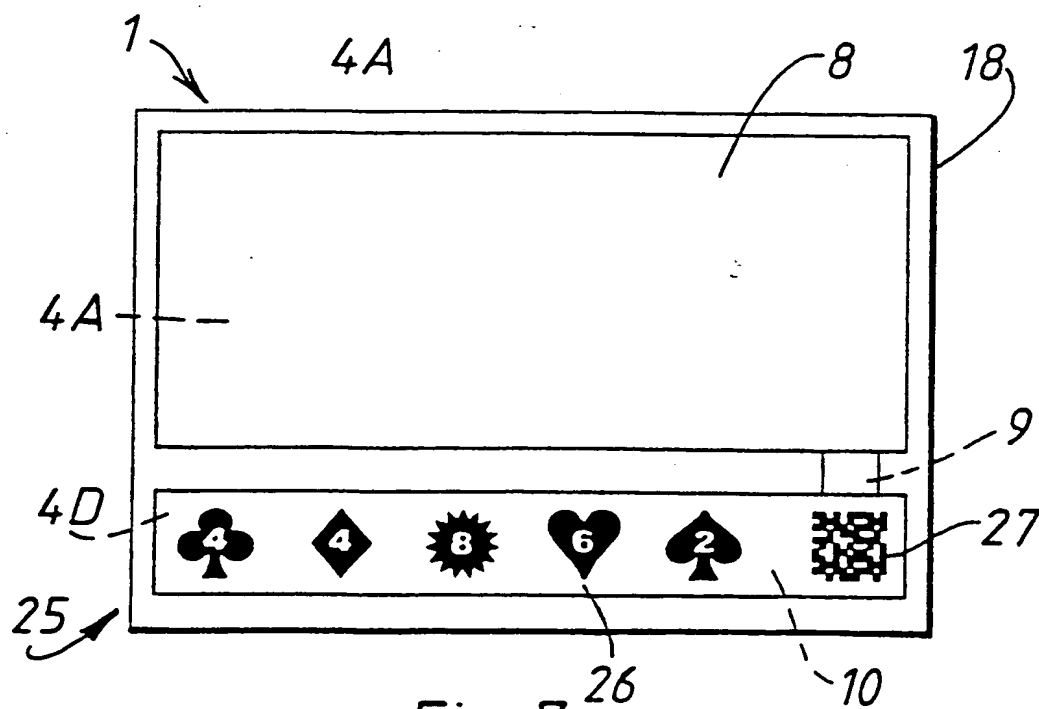
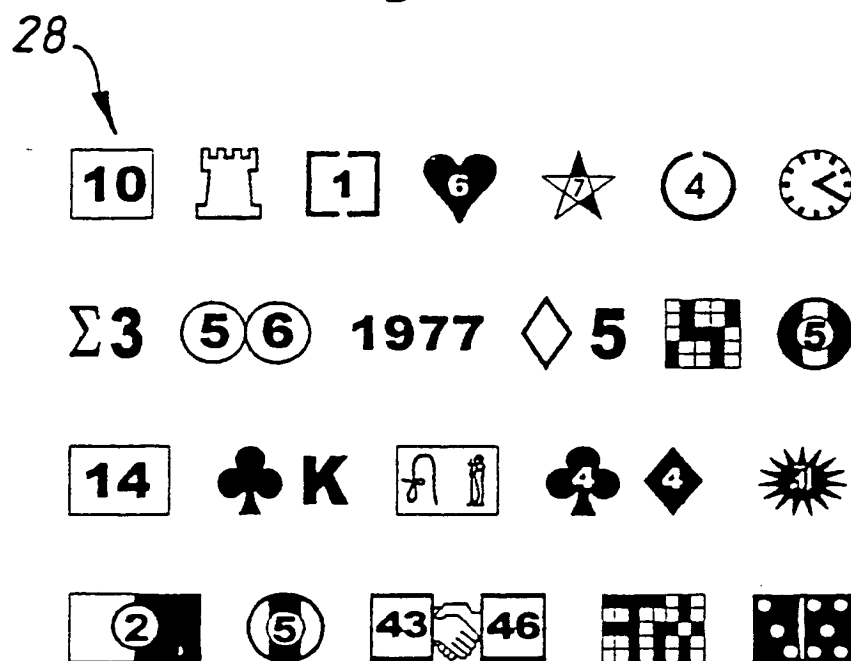


Fig. 7

*Fig. 8*

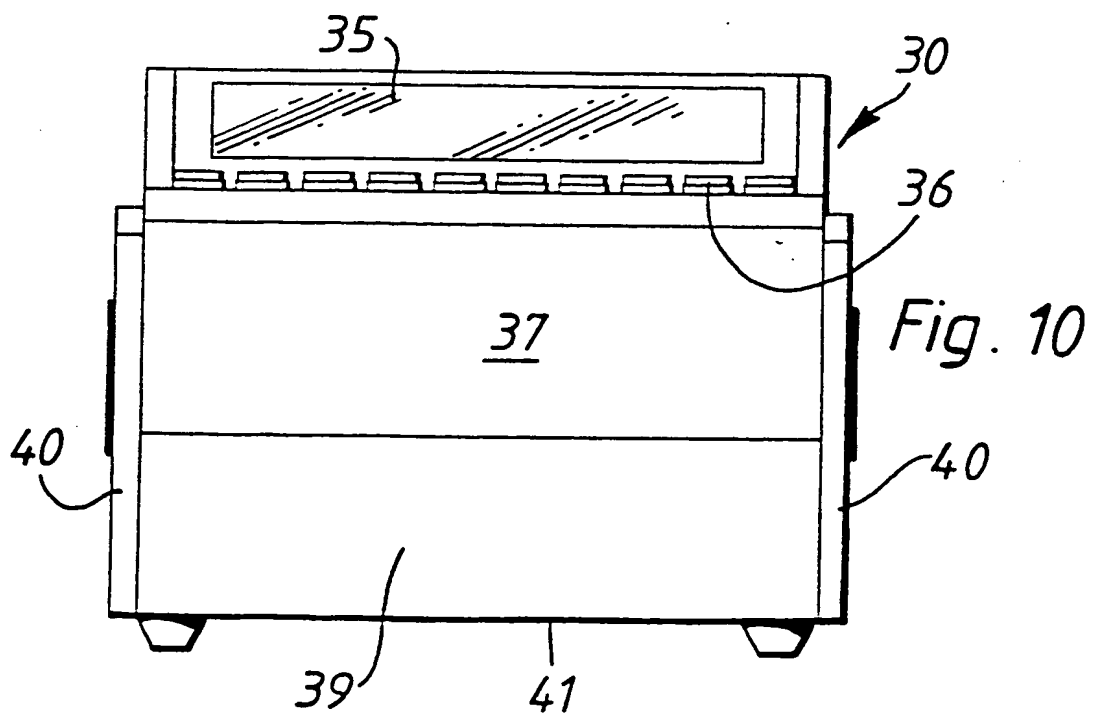
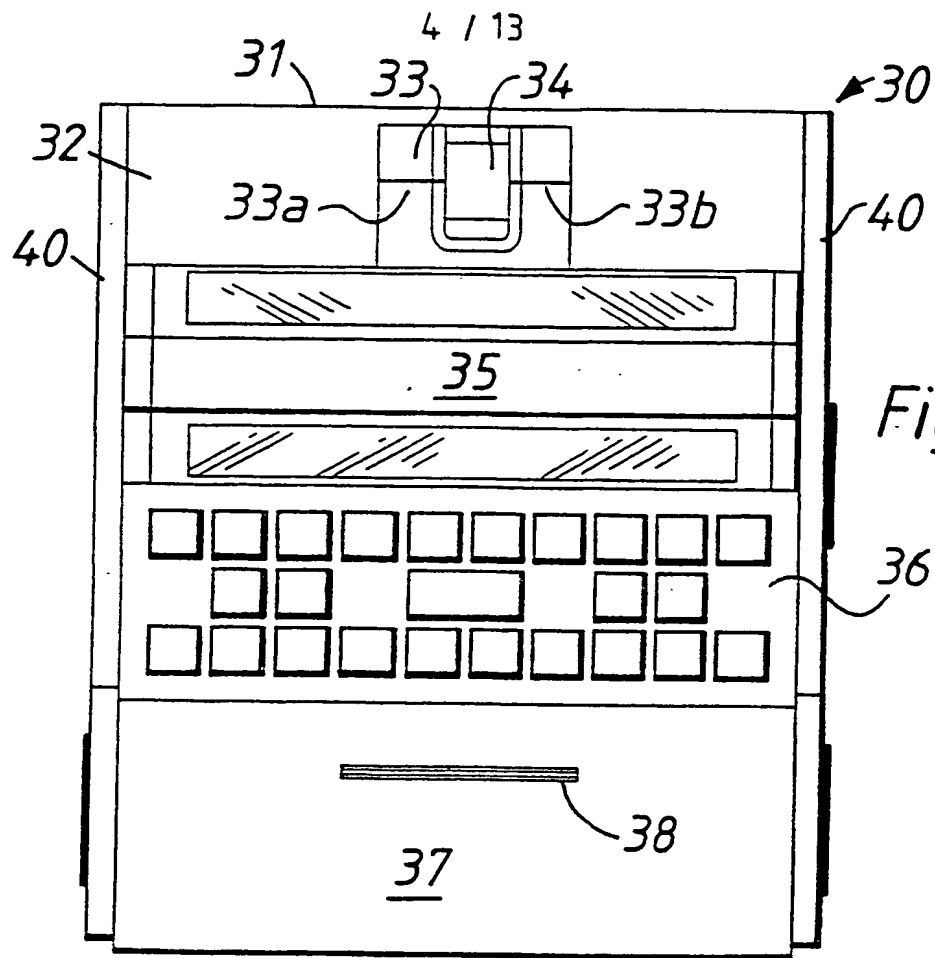
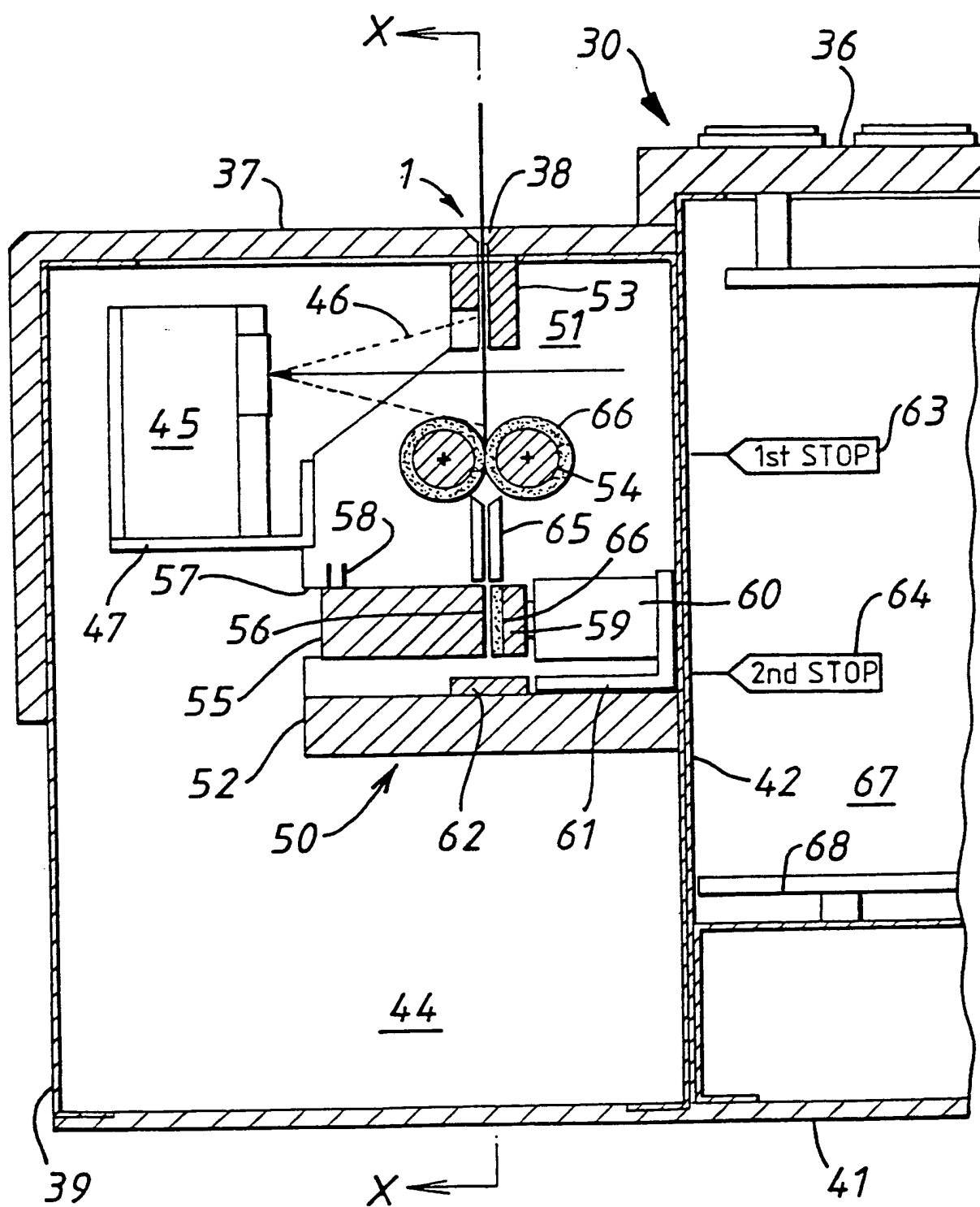
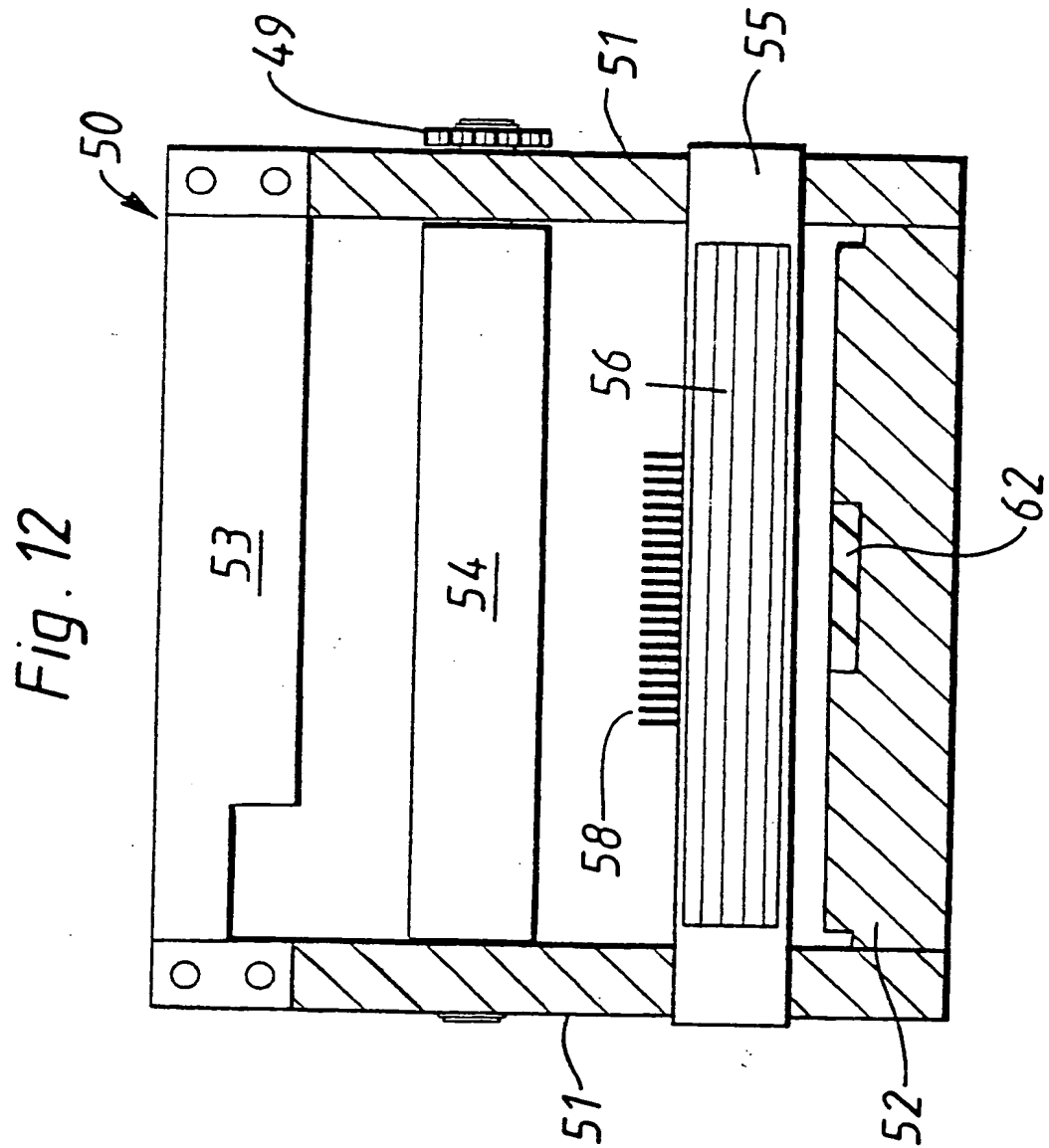


Fig. 11

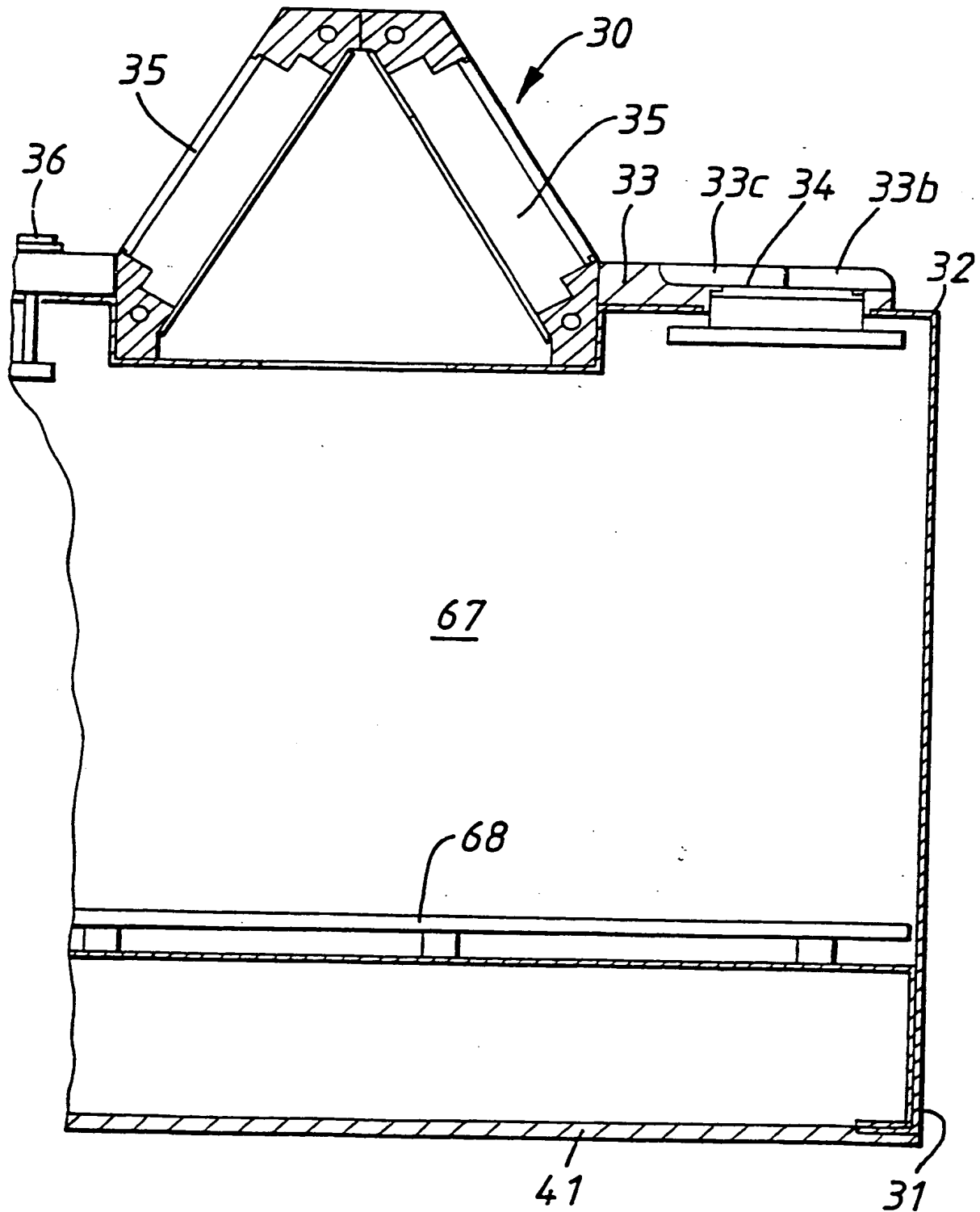






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Fig. 14



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*Fig. 15*

↙ 80

**CARD REGISTRATION**

Insert Card to 1st Stop position	63
Scanner Reads 3-Digit Matrix	45
Press Card Selector Key (Align)	36
Card Lowers to 2nd Stop Position	64
1st Print Sequence Completed	50
Card Lifts to 1st Stop Position	63
Scanner Reads 26-Digit Matrix	45
Press Sensor Key to Register (Binary Matrix Transmission)	34 23
Card Registration Completed	20
Terminal Display Acceptance	35
Remove Card from Terminal	30

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Detach Upper Card Portion	-
Insert Card to 1st Stop Position	63
Card Lowers to 2nd Stop Position	64
2nd Print Sequence Completed	50
Card Lifts to 1st Stop Position	63
Card Registration Completed	20
Remove Card from Terminal	30

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**CARD REGISTRATION**

Insert Card to 1st Stop Position	63
Scanner Reads 3-Digit Matrix	45
Press Sensor Key to Register (Binary Matrix Transmission)	34 27
Card Lowers to 2nd Stop Position	64
Card Registration Completed	25
Card Lifts to 1st Stop Position	63
Scanner Reads 38-Digit Matrix	45
Terminal Display Acceptance	35
Remove Card from Terminal	30

↙ 82      *Fig. 16*

**CARD VALIDATION**

Insert Card to 1st Stop Position	63
Scanner Reads 26-Digit Matrix	45
Press Card Selector Key (Align)	36
Key-In Transaction Entry Value	36
Press Sensor Key to Validate (Binary Matrix Transmission)	34 23
Card Validation Completed	20
Terminal Display Acceptance	35
Remove Card from Terminal	30

↙ 83

**CARD VALIDATION**

Insert Card to 1st Stop Position	63
Scanner Reads 38-Digit Matrix	45
Press Send Key to Validate (Binary Matrix Transmission)	36 27
Card Validation Completed	25
Terminal Display Acceptance	35
Remove Card from Terminal	30



1 2 85 8
8 87 2 1

CREDIT CARD

CREDIT CARD

**PROTOCOL:** This Credit Card entitles the cardholder to enter the retail value of goods and services at Selecto terminals for credit transactions within the authorised credit limit, on the premises of the retail outlets overleaf, subject to the conditions of use. The

SEAL


SERIAL NUMBER


10


10


CONDITIONS OF USE

**CARDHOLDER:** This Credit Card is valid for one year from issue date with annual renewal for continued account status, to maintain monthly balance settlements by direct debit payment









**RETAILER:** This credit Card must be inserted in the Selecto terminal to enter the retail value for terminal display and the cardholder must press the Scan Key to validate the credit

CARDHOLDER

TITLE

SURNAME

ADDRESS

COUNTRY

FIRST NAME

POST CODE

SIGN HERE

8

CARD-ISSUER

This Credit Card is issued by the card-issuer to the cardholder named overleaf in accordance with the cardholder instruction for direct debit or giro credit payments and cardholder acceptance of the Protocol conditions of use, as printed in the Retail section of

SEAL

SERIAL NUMBER

8

8

Fig. 17

Fig. 17 (contd.)

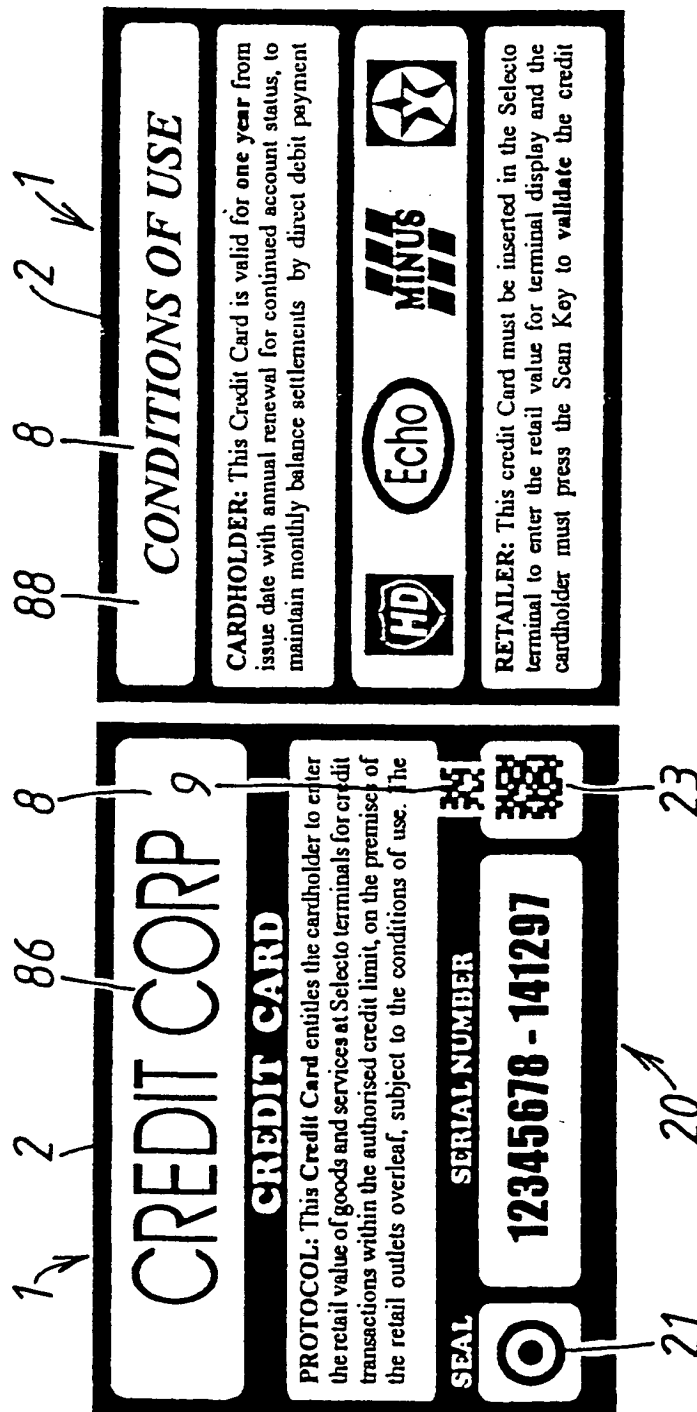
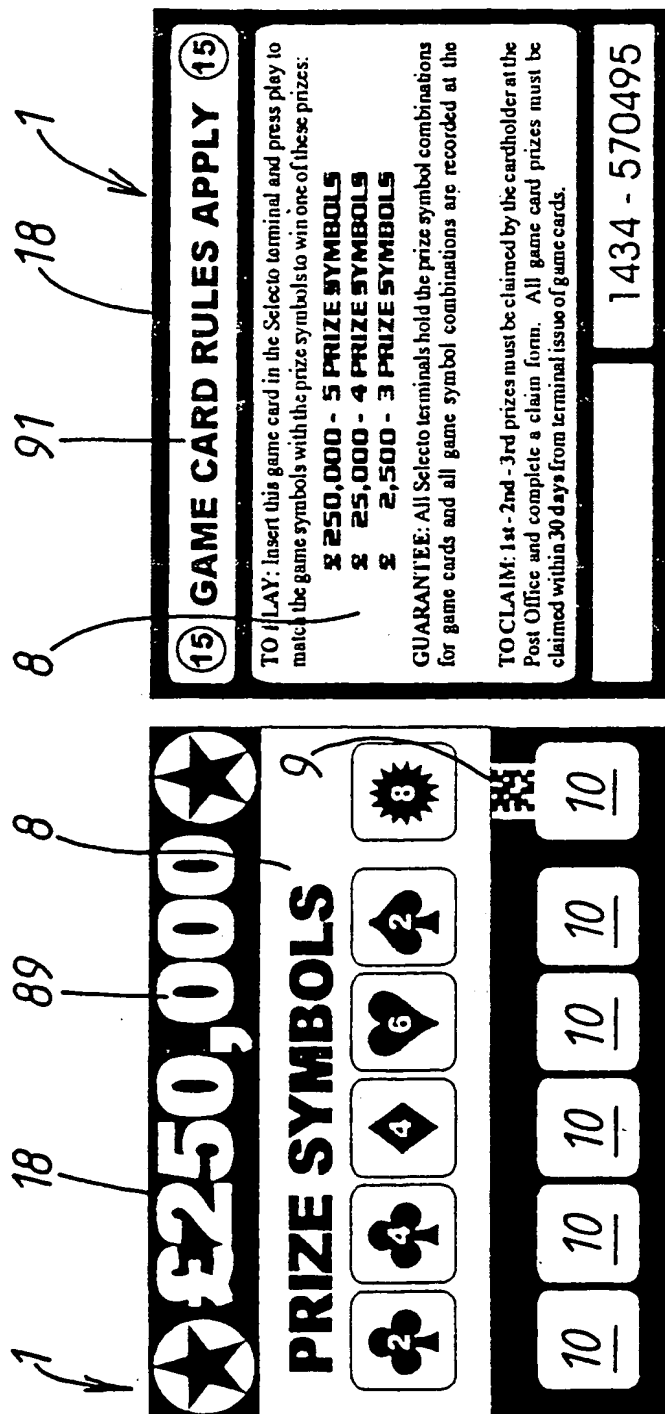


Fig. 18





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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup> :</b> <b>G07F 7/12, G07C 9/00, B41M 5/40</b>	<b>A3</b>	<b>(11) International Publication Number:</b> <b>WO 99/36889</b> <b>(43) International Publication Date:</b> 22 July 1999 (22.07.99)
<b>(21) International Application Number:</b> PCT/GB99/00139 <b>(22) International Filing Date:</b> 15 January 1999 (15.01.99) <b>(30) Priority Data:</b> 9800854.3 16 January 1998 (16.01.98) GB <b>(71) Applicant (for all designated States except US):</b> NEXUS CORPORATION S.A. [CH/CH]; 14, rue du Rhône, CH-1204 Geneva (CH). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> RHIANDO, Maxwell, Earl [GB/GB]; Bromstone House, Beech Avenue, Camberley, Surrey GU15 2JT (GB). <b>(74) Agent:</b> SMITH, Norman, Ian; FJ Cleveland, 40-43 Chancery Lane, London WC2A 1JQ (GB).		<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>  <b>(88) Date of publication of the international search report:</b> 17 February 2000 (17.02.00)
<b>(54) Title:</b> TRANSACTION SYSTEM  <b>(57) Abstract</b>  A network transaction system including terminals and database servers which are adapted to issue transaction cards as well as to accept cards for subsequent transaction use. The cards include impersonal information, i.e. not including any personal information about the user, and the terminals are adapted to capture personal information directly from the user for verification purposes. The impersonal information on the card and the personal information of the user are discrete.		

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# INTERNATIONAL SEARCH REPORT

International Application No  
**PCT/GB 99/00139**

**A. CLASSIFICATION OF SUBJECT MATTER**  
**IPC 6 G07F7/12 G07C9/00 B41M5/40**

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

**IPC 6 G07F G07C B41M**

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X  A	EP 0 397 512 A (MATERIAL ENGINEERING TECHNOLOGY LABORATORY) 14 November 1990 (1990-11-14) the whole document          —  —/—	1-3     4-6, 8, 9, 15-17, 20, 21, 23-25

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

**15 December 1999**

Date of mailing of the international search report

**28 12 1999**

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# INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 99/00139

## C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 534 712 A (TRAITEMENT DE L'INFORMATION TECHNIQUES NOUVELLES) 20 April 1984 (1984-04-20) abstract; claims	1,2,5
A		3,4, 8-12, 14-18, 20,23, 28,30, 31, 33-37, 40,41, 43-45
	page 5, line 15 -page 11, line 18	
A	US 4 636 622 A (C.P. CLARK) 13 January 1987 (1987-01-13) the whole document	1-9, 14-23
A	GB 2 172 731 A (SANDEN) 24 September 1986 (1986-09-24)	
A	US 3 890 599 A (L.G. SIMJIAN) 17 June 1975 (1975-06-17)	
A	US 3 833 795 A (A. SHOSHANI) 3 September 1974 (1974-09-03)	
A	WO 89 00741 A (W.F. HUXLEY) 26 January 1989 (1989-01-26)	
A	EP 0 744 715 A (AT & T) 27 November 1996 (1996-11-27)	
A	US 4 338 025 A (E.D. ENGEL) 6 July 1982 (1982-07-06)	
Y	EP 0 405 054 A (TELENORMA) 2 January 1991 (1991-01-02) abstract; claims; figures	30,34
A		31,33, 35-40,44
	column 4, line 48 -column 5, line 33	
Y	GB 2 183 356 A (FUJI PHOTO FILM) 3 June 1987 (1987-06-03) page 1, line 1 -page 2, line 5	30,34
A	EP 0 607 444 A (ACE DENKEN) 27 July 1994 (1994-07-27)  abstract; claims; figures	30,31, 33-37, 39,40, 43-45



# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/GB 99/00139

## Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
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3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-29,32

Transaction system and terminal for issuing cards and storing the card-identifiers, associated with biometric user-identifiers, in a server's database, enabling subsequent validation of the cards and identification of the users.

2. Claims: 30,31,33-45

Multi-layered card for thermographic printing.

**information on patient family members**

PCT/GB 99/00139

Form PCT/ISA/210 (patent family annex) (July 1992)

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